C-A OPERATIONS PROCEDURES MANUAL

8.15.1 C-A Equipment Annual Calibration Procedures for Chipmunks

Text Pages 2 through 5

Attachment

Hand Processed Changes

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Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman   Date

V. Castillo

8.15.1 C-A Equipment Annual Calibration Procedure for Chipmunks

1.   **Purpose**

The purpose of this document is to provide instructions for annual re-calibration of the Chipmunk radiation monitor.

2.   **Responsibilities**

The Chipmunks are calibrated and maintained by technicians from the Access Controls Group (ACG).

3.   **Prerequisites**

3.1   Trained and qualified ACG technician, source training and Radiological Worker Training I, Thermoluminescent Dosimeter (TLD), and Self Reading Dosimeter (SRD) required.

3.1.1   Each Chipmunk shall be calibrated annually and after repair. The annual calibration period may be extended up to 3 months with the concurrence of the Radiation Safety Committee Chair. A new calibration schedule must be submitted to the Radiation Safety Committee Chair.

3.1.2   The calibration sources will be calibrated by the Radiological Control Division (RCD) every three years for NIST traceability. Do not proceed unless the sticker on the source shield indicates calibration within the past three years.

3.1.3   The test box, digital multi meter, and oscilloscope used for Chipmunk calibration shall have been calibrated within the previous year at the C-A Department Calibration Lab.

4.   **Precautions**

4.1   The Cesium - 137 sources must be retracted or shielded when moving or positioning the Chipmunk on the test fixtures.

4.2   The tolerance on detector calibration data points is ±10% of the conventionally true value.

5.   Procedures

5.1   Physical Inspection

     5.1.1   Inspect each chassis as necessary for: loose connectors, loose wiring, damaged AC line cord, poor solder connections, loose mechanical connections.

     5.1.2   Correct faults before proceeding with calibration.

     5.1.3   Check and adjust front panel meter for zero before power is applied to the unit.

5.2   Power Supply Check

     5.2.1   Open blue box; set quality factor switch to upper position (QF5).

     5.2.2   Apply AC power and check all bulbs.

     5.2.3   Replace the bulb in the green light; these bulbs have a service life of only about one year.

     5.2.4   Check that +5, +15, -15 volt power supply nodes are within ±5% using a digital meter. Use oscilloscope to check that peak-peak ripple voltage on each low voltage node is less than 0.2% of nominal output.

5.3   Failsafe check

     5.3.1   Tie +5v to TPI on RD84 bd. After 1.5 to 4 minutes note 22V drop out.

          5.3.1.1 On RHIC model note fail safe LED turns off.

5.4   As found calibration check

     5.4.1   Switch power on and allow unit to stabilize for about one hour. Connect Chipmunk MUX output to the scaler portion of the test box. Move the Chipmunk to a low background to stabilize for 30 minutes in background region. Perform background count for 1000 seconds and record value on Attachment No. 8.15.1.a

     5.4.2   Move Chipmunk to calibration table with power still applied and test box connected. Unlock the cover on the source shield and expose the chipmunk to an 8 mr/hr gamma field. Allow to stabilize for five minutes. Perform a 100 second count on the scaler three times and record each reading. Check the average frequency of these runs with the last calibration average reading. If the difference is greater than ±20%, notify the ACG Leader and the C-A ESHQ Division to investigate.

5.4.3   If steps 5.4 and 5.5 are okay, proceed to 5.6. Otherwise repair and return to 5.2.

5.5   Detector Calibration

5.5.1   Observe safe operating procedures; retract or shield source when not in use, and when changing units; DO NOT GO FORWARD OF THE SOURCE UNLESS IT IS RETRACTED!

5.5.2   Unlock the cover on the low radiation source shield and expose the Chipmunk to an 8 mr/hr gamma field. Allow to stabilize for 5 minutes. Perform a 100 second count on the scaler. Adjust the top pot on the RP-84A/84B for a reading between 4.50 and 4.59 Hz. Make three additional 100 second measurements and record average.

5.5.3   Close and lock the source shield. Remove the Chipmunk, while still powered, to a low background region away from the source. Allow unit to stabilize for 30 minutes. Perform background count for 1000 seconds. Background should read between 50-200 counts. If background is out of tolerance, repair and return to 5.2.

5.6   High Range Source Checks

5.6.1   Move Chipmunk to Cesium-137 high radiation source test location with test box and power connected. Unlock the cover on the source shield and expose the Chipmunk to an 80 mr/hr gamma field. Allow to stabilize for 5 minutes. Perform a 100 second count on the scaler and record; repeat twice. Acceptable counts are 4500 counts ±10%.

5.6.2   Expose Chipmunk to 150 mr/hr gamma field. Perform 3 counts each of 100 seconds and record readings. Acceptable counts are 8520 counts ±10%.

5.7   S-Level check using High Radiation Source.

5.7.1   Using the output connector on the test box verify, and if necessary adjust the S-level trip points on the RP63/63A rate meter to be within ±10% of the indicated values.

5.7.1.1 For RHIC models use special RHIC S-level test box and perform same test and adjustment

5.8   Calibration Label.

5.8.1   Remove the calibration label from the unit and attach new one indicating current date, next calibration date, and your signature or initials.

6.   Documentation

6.1   A log sheet C-A-OPM 8.15.1.a is to be filled out for each unit.

6.2   Calibration sticker is to be attached to each unit.

7.   References

None

8.   Attachments

8.1   C-A-OPM-ATT 8.15.1.a "Chipmunk Calibration Log Sheet"